



BUILDING A SMARTER ENERGY FUTURE<sup>SM</sup>

Public Service Commission of South Carolina Allowable Ex Parte

# DEVELOPMENTS IN SOLAR POWER IN SOUTH CAROLINA



*March 29, 2018*

PRESENTED BY:  
Duke Energy Carolinas and Duke Energy Progress



## Presenter

Gary Freeman

*Duke Energy - General Manager,  
Renewables Compliance, Origination, and Operations*



**\$6.6 billion**  
ANNUAL STATEWIDE ECONOMIC IMPACT\*

This figure reflects the dollar value representing all final goods and services produced in South Carolina that can be attributed (either directly or indirectly) to Duke Energy.



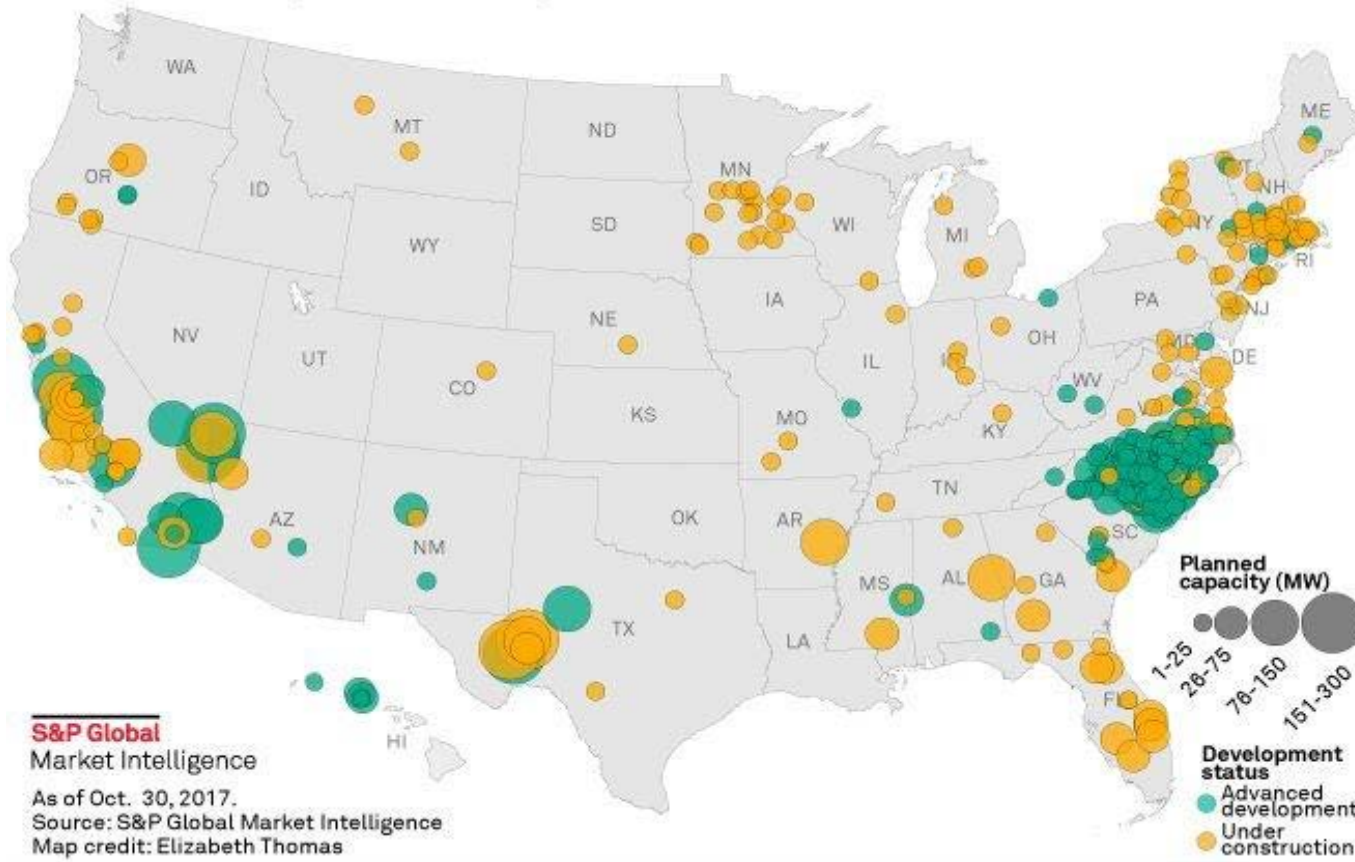
Corresponds to **15,189 jobs** and **\$969.4 million** in **labor income** that would not exist without Duke Energy\*



Helped recruit **\$1.7 billion** in **capital investment** and **2,635 new jobs** in 2017

\* Source: Dr. Joseph C. Von Nessen Economic Impact Study, October 2017

## US planned utility scale solar projects in advanced development or under construction



South Carolina vaulted nine spots (from 27 to 18) into the top 20 markets for solar power\*

\*CNBC: Solar power: Here's where your state now ranks  
<https://www.cnbc.com/2018/03/15/solar-power-heres-where-your-state-now-ranks.html>

## Key considerations

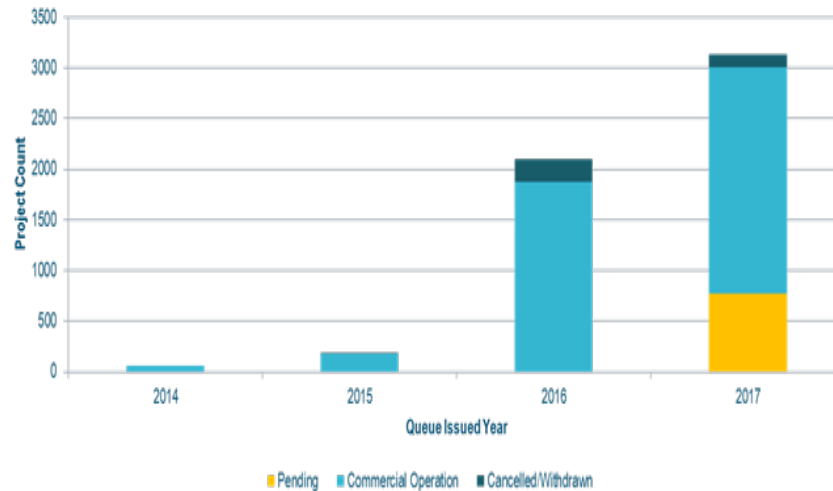
- Multiple possible paths for future solar development
- Pace of adoption is important
- Ensuring reliable electric service
- Assessing and mitigating economic risk to consumers



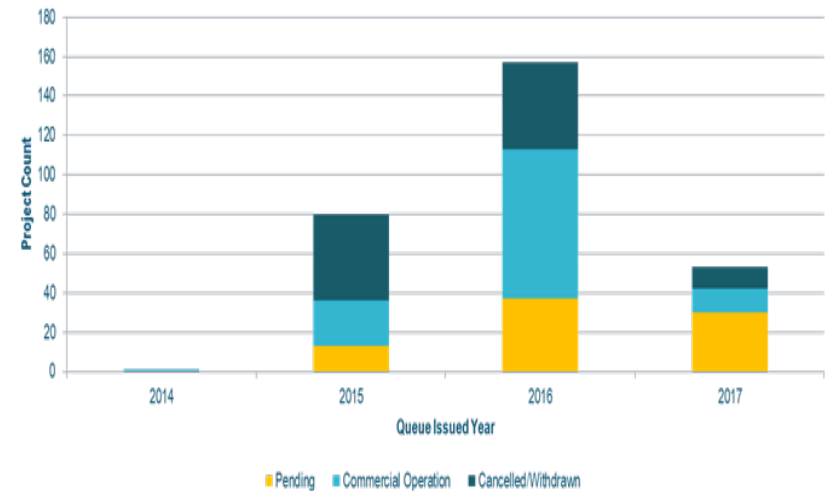
## Duke Energy is committed to meeting generator interconnection requirements

- Duke Energy is meeting retail customer interconnection timelines in 2017
- Residential/commercial interconnections follow expedited process
- Small generator interconnections less complex
- More than 70 megawatts (MW) connected in past two years

SC Solar Projects 20 kW or Less  
Source: January 2018 Month End Internal Data

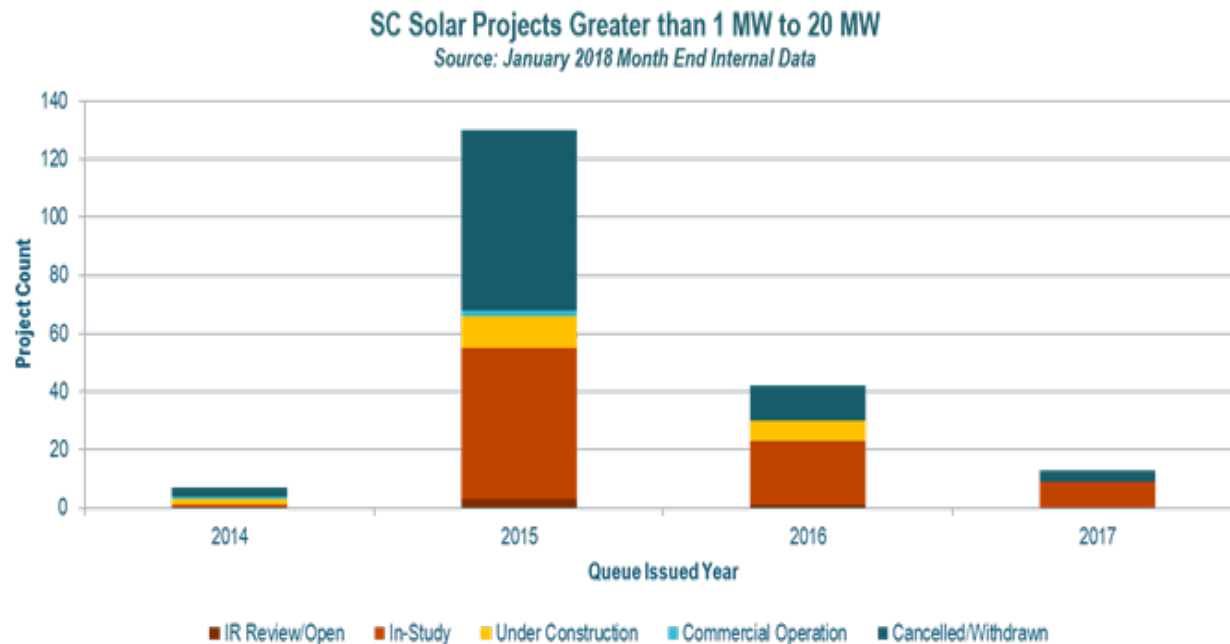


SC Solar Projects Greater than 20 kW to 1 MW  
Source: January 2018 Month End Internal Data



## Large Scale Queue Status: A Surge in Applications

- The surge in S.C. began about the time Duke Energy was experiencing power quality issues in N.C.
- Duke has found itself leading the “living laboratory” on safely and reliably integrating large-scale solar photovoltaic (PV) onto the distribution system
- Duke Energy is managing surging large generator queue requests while working on process improvements





## Interconnection – Technical Screens and Study Methods

### NOT EVERY PROPOSED INTERCONNECTION IS OPTIMAL FOR THE SYSTEM

- Duke Energy Carolinas (DEC) Wholesale Customer Complaint
  - One solar PV project - too big and in the wrong place
  - \$11 million in grid upgrades to solve complaint
- The Campbell's Soup Company “wake-up call” (February 2016)
  - Another solar PV project - too big and in the wrong place
- The Olanta Substation: “Poster Child” for unguided development
  - 17 projects totaling 146 MW exceeds the capability of the substation by roughly 120 MW
  - Project sizes range from 2 MW-15 MW and up to 5 miles from the substation



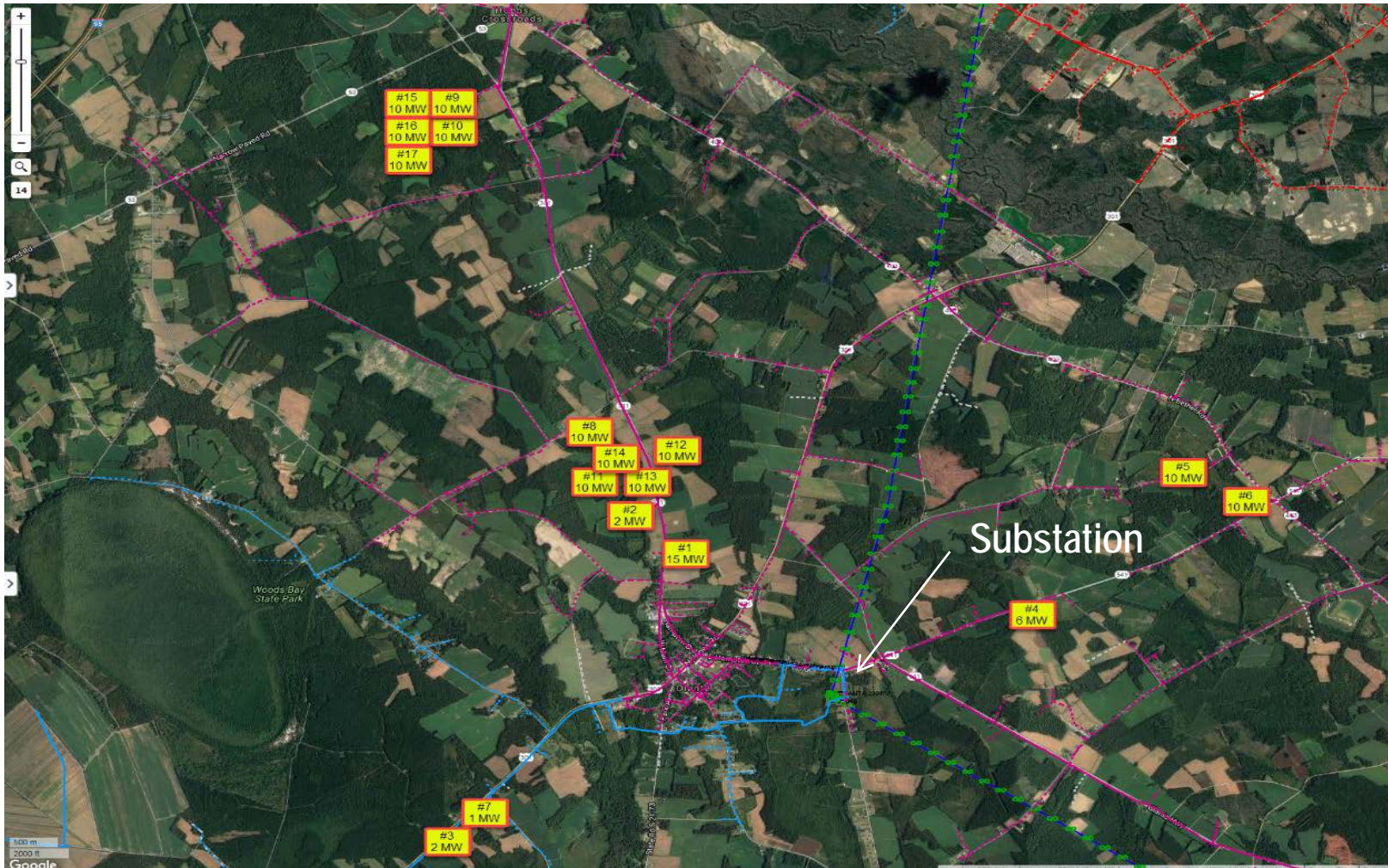
## Interconnection – Technical Screens and Study Methods

### DUKE ENERGY RESPONSE TO CAMPBELL'S SOUP WAKE-UP CALL

- June 2016 – Established circuit stiffness review (CSR) evaluation
- Applied to all utility-scale projects that had not yet executed interconnection agreements
- CSR evolved from “fast no” to “slower (often smaller) yes”
- Provided detailed answers to North Carolina Utilities Commission (NCUC) regarding growing power quality risks and Duke Energy response.
- Found Duke Energy “taking appropriate steps to ensure electric service to retail customers is not degraded due to the operations of newly interconnected generation facilities.” – NCUC Order, Docket No. E-100, Sub 101.

## Interconnection – Technical Screens and Study Methods

### THE OLANTA SUBSTATION ABSENT INTERCONNECTION GUIDANCE



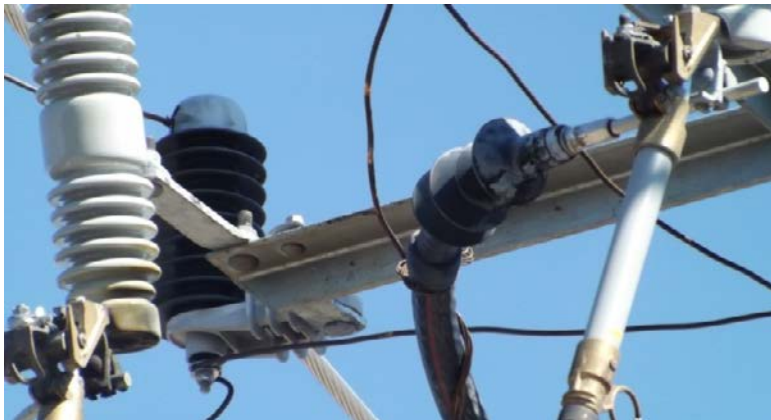
## Interconnection – Technical Screens and Study Methods

- Advanced study criteria now used to solve for the “too big and in the wrong place” project development; designed with solar developer input
  - Mitigation options communication allows for “right-sized” development at lower cost (or full-size at higher cost)
- Locational screens designed to protect transmission, distribution and generation assets
- Method of service guidelines bring it all together
- Duke Energy is committed to being transparent and collaborative, and has initiated a technical stakeholder working group with solar developer engineers, Office of Regulatory Staff (ORS), and N.C. Public Staff
  - First meeting is scheduled for April 11
- Collaborating with Electric Power Research Institute (EPRI) to evaluate the need for enhanced standards, testing and field investigations



## Interconnection – Technical Screens and Study Methods

- Construction standards needed to be addressed
- Duke Energy now performs full commissioning/inspection before energizing



## N.C. H. 589 Competitive Procurement Of Renewable Energy (CPRE) Program

- Competitive RFP procurement of 2,660 MW renewable energy over next four years
- S.C. solar projects up to 80 MW eligible to compete and win PPAs if most cost effective
- Duke Energy has met with S.C. solar industry to describe CPRE RFP opportunity and timing
- Expect large transmission-connected projects to be most competitive
- Committed to ensuring interconnection of S.C. projects already under development will not be negatively impacted



## Rates and Improvements

### QUALIFYING FACILITIES (QF) RATES AND TARIFFS

- PURPA creates an obligation for utilities to purchase, and customers to pay for, private sector QF power put onto the grid
- Original intent of PURPA was to leave customers indifferent to QF power vs. the utility's alternative generation with a value based upon the utility's "avoided cost"
- However, PURPA QF rates are only one pathway for renewable resources to be placed into the S.C. energy portfolio



## Rates and Improvements

PURPA AVOIDED COST METHODOLOGY REMAINS VALID, BUT UPDATES AND IMPROVEMENTS ARE NEEDED

- Current QF rates are above today's value created from incremental QFs and require updates
- PURPA places no limit on the volume of facilities that subscribe to the QF rate offering
- As solar penetration increases, the value of incremental solar declines and operational issues increase
- Longer-term PURPA QF contracts result in greater risk of significant consumer overpayment for QF power

## PPA Issues

### NATIONAL TREND MOVING TO SHORTER-TERM CONTRACTS

- Longer-term contracts transfer risk from developers and financial institutions to the customers
- Regional examples:
  - Tennessee, Alabama\*, Mississippi: 1-year term
  - North Carolina: 5-year term for all QFs above 1 MW
- 10-year contract term is the current “standard offer” in South Carolina
- Cost of service rate recovery differs from how QFs recover their costs
  - Utilities are limited to a regulated return while QFs’ returns are not regulated
  - Utilities are limited to inclusion of the depreciated book balance in base rates while QFs may receive well above book value at the expiration of the contract

\*One-year term with evergreen provision

## Rates and Improvements

DUKE ENERGY AGREES THAT AVOIDED COST RATES AND PROCESS COULD BE MORE PRECISELY DEVELOPED TO REFLECT SOLAR'S OPERATIONAL CHARACTERISTICS AND VALUE

- Changing industry conditions
  - Industry is moving away from long-term PURPA QF rates in favor of more economic and reliable paths for adding renewables in concert with utilities repowering the grid, managing operating impacts, system growth and energy efficiency
  - Cost structure declines for solar development should be shared with utility customers purchasing power from QFs
- Growing importance (and complexity) of integrating solar
  - Solar is a valuable addition to a resource mix if procured economically at an adoption rate that matches consumer need, especially as solar development costs are declining
  - Grid and fossil fleet must be operated in new ways to plan for and accommodate solar
- Technological changes like solar + storage creating new opportunities
  - Duke Energy is committed to piloting battery storage
  - Benefits of storage require dynamic and fluid operation of the storage device which is not consistent with third party long-term fixed price obligations

## Rates and Improvements

### SUGGESTED NEXT STEPS

- The need for updates and improvements is real; updates are needed to properly reflect the value that solar provides
- Duke Energy looks forward to working with all stakeholders to ensure costs are reasonable and reliability risks are minimized as increasing levels of solar are brought online in South Carolina
- Collaborative efforts to improve the PURPA construct through the regulatory process is the way to succeed

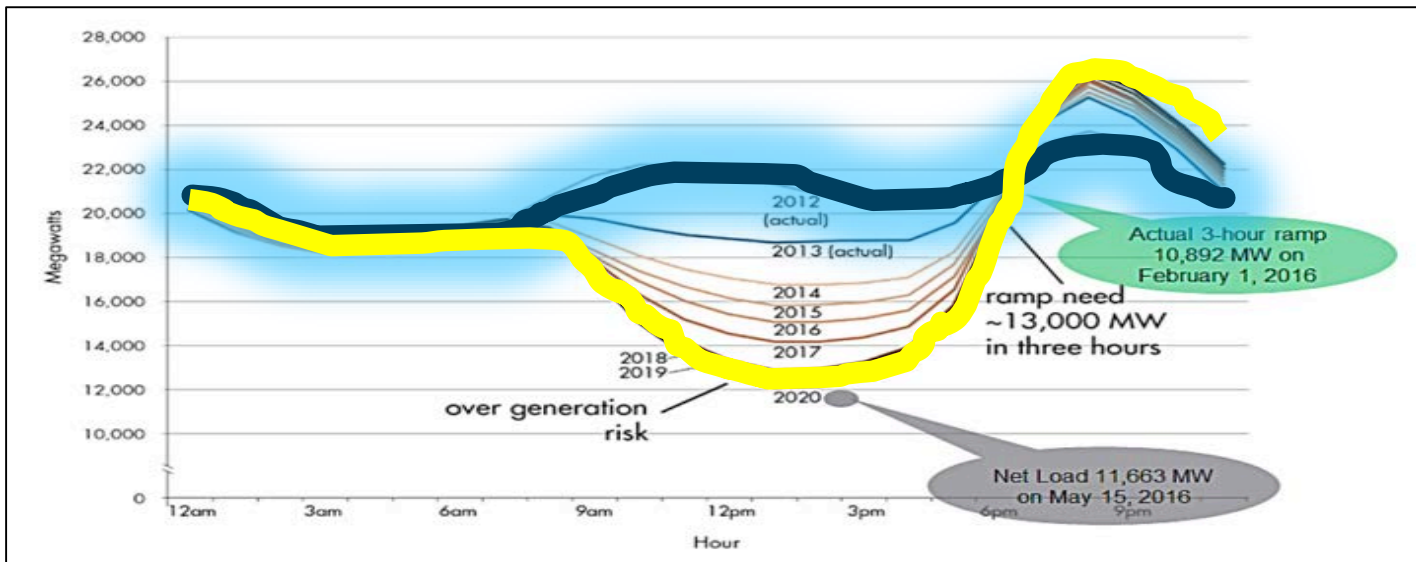
## BEYOND RATES AND TARIFFS: Operational Challenges of Integrating Significant Levels of Solar Resources

DUKE ENERGY PROGRESS (DEP) IS NOW THE CALIFORNIA OF THE EAST COAST

- Managing “unscheduled” and “unconstrained” solar QF energy injections bounded by the security constrained unit commitment of reliable load-following service
- Managing the variability and intermittency of solar energy injections
- Managing the growing amounts of operationally excess energy injected by solar facilities, particular during the spring, fall and winter periods
- Ensuring compliance with NERC reliability standards, specifically including the BAL standards
- Determining costs associated with ancillary services impacts of solar resources and appropriately incorporating these costs in PURPA rates

## CALIFORNIA's 'DUCK CURVE' – What to watch out for as solar development grows

- Adverse impacts on the California load shape projected to occur by 2020 have already occurred
- Experiencing operationally excessive energy during midday hours and deficit energy issues during the steep ramping period of the evening peak demand
- DEP's operational experience increasingly resembles these challenges



California Independent System Operator ("CAISO") Fact Sheet, accessible at [http://www.caiso.com/Documents/FlexibleResourcesHelpRenewables\\_FastFacts.pdf](http://www.caiso.com/Documents/FlexibleResourcesHelpRenewables_FastFacts.pdf).



Presenter

Frank Ellerbe  
*Sowell Gray Robinson Stepp & Lafitte, LLC*



## Pending Legislation

S.890/H.4796

- Currently PURPA implementation issues are addressed by the Public Service Commission of South Carolina (PSCSC)
- S.890/H.4796 would address certain PURPA issues by statute instead of by the PSCSC
- Issues include: Length of PPAs; size of the “standard offer;” frequency of hearings on avoided cost
- Duke Energy opposes these bills because the PSCSC is in a better position to balance the interests of developers and customers

## Pending Legislation

S.890/H.4796 & S.987/H.5001

- Contrast the go-it-alone approach taken by the supporters of S.890/H.4736 & S.987/H.5001 with the process that led to Act 236 of 2014
- Act 236 was the result of a long collaboration among a large and diverse group of stakeholders who worked to produce a balanced bill that promoted solar deployment but protected ratepayers from paying excessive subsidies; it passed both houses unanimously
- Act 236 has been a success - resulting in very rapid solar deployment with minimal adverse impacts on ratepayers

## Pending Legislation

### GREEN SOURCE ENERGY

- Ability for customers to purchase their selected amount of green sourced energy
- Purchase of a specific source of energy (solar, landfill gas, wind, etc.)
- Any costs above the avoided cost of energy is paid by the requesting customer to the providing energy generator (premium energy costs, renewable attribute value, renewable energy certificate)
- Presently a few customers are purchasing renewable energy certificates from the company to help meet sustainability goals

## Pending Legislation

S.987/H.5001

- Bills propose “Greensource” or renewable energy riders be implemented by statute
- Duke Energy supports the general concept of Greensource rider but believes it should be done by the PSCSC
- The PSCSC is in a better position to balance the interests of the customers who want renewable energy and the general body of ratepayers

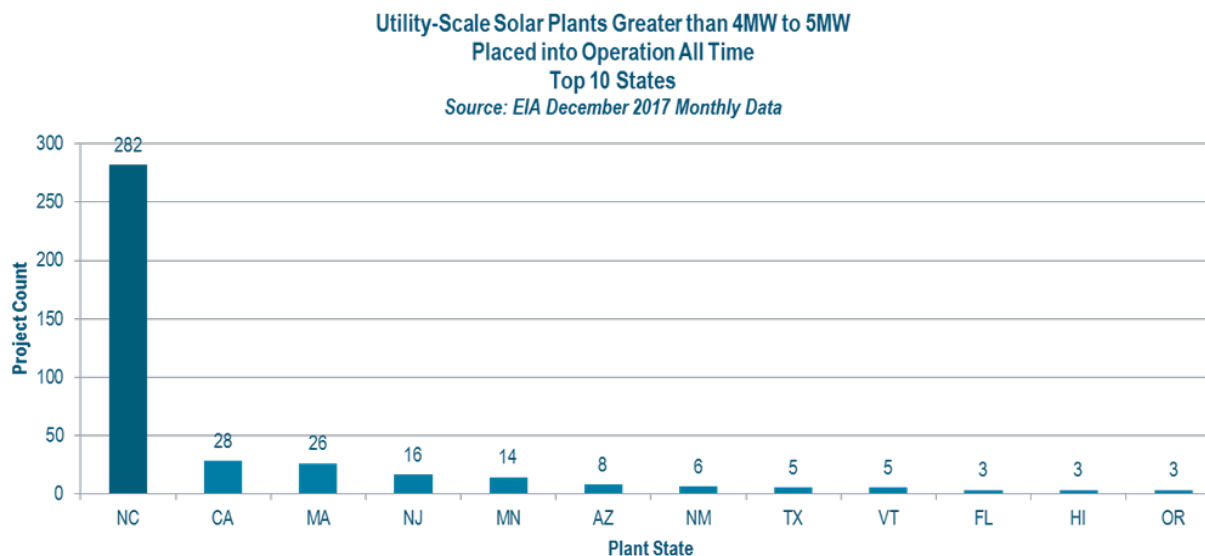


## Presenter

Brett Breitschwerdt  
*McGuire Woods LLP*

## North Carolina's PURPA Experience

- Year-end 2011: less than 30 MWs of solar installed on DEP and DEC systems
- Year-end 2015: Energy Information Administration reports N.C. has more PURPA solar QFs than any other state in U.S. – over 1,150 MWs installed
- Fall 2017: “Existing regulatory and legislative policies have created a ‘distorted marketplace’ for solar projects . . . result[ing] in artificially high costs being passed on to North Carolina ratepayers.” – NC Utilities Commission Order Docket No. E-100, Sub 148.
- Fall 2017: N.C. enacts H. 589 to reform PURPA implementation
- December 2017: NARUC letter to FERC calling for national PURPA reform



## N.C. Competitive Energy Solutions Legislation

H.589 ENACTED JULY 27, 2017

- Legislatively reforms N.C. PURPA implementation
- Establishes competitive utility-scale renewable energy procurement process (2,660 MW); includes S.C.-located options
- Large customer-focused “green rider” renewable energy procurement program (600 MW); includes S.C.-located options
- Authorizes regulated solar leasing program similar to Act 236
- Creates solar rebates program for net-energy metering (NEM) customers similar to Act 236
- Community solar program similar to Act 236



## N.C. Competitive Procurement Of Renewable Energy (CPRE) Program

H.589

- Alternative RFP program available to PURPA renewable QFs up to 80 MWs in size
- S.C. QF projects eligible to compete
- Cost of resources capped at avoided cost to ensure cost effectiveness for customers
- Program solves for projects too big and in the wrong locations
- Minimize network upgrade costs
- PPAs provide operational flexibility
- Renewable attributes (REC) benefit ALL retail/wholesale customers



## CONCLUSIONS

### Multiple possible paths for future solar development

- Competitively procured solar resources ensure consumers are receiving the best possible value from incremental solar development

### Pace of adoption is important

- Thoughtful consideration of customer need, technology cost trends, natural gas cost trends and other market factors should guide the pace of solar additions in South Carolina

### Ensuring reliable electric service

- Exponential growth in interconnection requests must be carefully studied
- High levels of solar penetration increases ramping and turn-down requirements for dispatchable generation resources creating new challenges

### Assessing and mitigating economic risk to consumers

- Long-term PURPA QF rates expose customers to significant overpayment risk
- Volumetric targets for solar adoption over time are preferred to unlimited adoption through expansion of PURPA standard offer rates

# QUESTIONS?

